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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/580,381	02/23/2007	Tomohiro Kawamoto	81707.0200	2559

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EXAMINER

HOBAN, MATTHEW E

ART UNIT	PAPER NUMBER
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1793

NOTIFICATION DATE	DELIVERY MODE
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03/03/2010

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/580,381	Applicant(s) KAWAMOTO ET AL.	
	Examiner Matthew E. Hoban	Art Unit 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11/17/2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 9-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 9-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>7/23/2009, 5/22/2006</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of 9-12 in the reply filed on 11/17/2009 is acknowledged. It is noted that the non-elected claims have been cancelled.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 10-12 and 14-16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. These claims include language "...are treated in an electric field in a no-load state prior to being subjected to the polarization treatment." This language is indefinite as a polarization step is a step where the piezoelectric device is treated under an electric field in a no load state. These steps define the same process and stating that one occurs before or after the other is confusing and indefinite as no language is given as to separate them. For this reason, the claims shall be interpreted as the polarization step and the electric field step comprising the same process. In sum, the electric field application step would have a polarizing effect on the sample, so it is unclear as to how a first electric field application step could possibly occur before a polarization step as these two process would occur in the same process.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 9-10, 12-14 and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by Tomoya in JP2003-201174 (machine translation provided, where all citations are relating to this translated copy).

Tomoya teaches a layered piezoelectric composition and a method of making such a composition as can be seen in the Examples (See Paragraph 21 onwards). These layered compositions are made by a process including forming a green sheet, creating an internal electrode with a conductive paste, and repeating this process as needed. Tomoya shows layered compositions having two and three distinct electrode layers (See Paragraph 23). This means that there is both a plurality of internal electrodes and of piezoelectric ceramic layers in the compositions as formed. Finally the composition is calcined, polarized in insulation oil under no load and heat treated as needed. The polarization in the oil bath does not occur instantaneously and would therefore include the state where the ceramic was unpoled, but the electric field had been applied, and the polarization treating of the ceramic, wherein the poles of the ceramic are align.

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Thereafter, the process of Tomoya includes both an electric field application step and a polarization treatment step.

The poling of the ceramics would have inherently created the gaps along the interface between the piezoelectric material and the electrode material. This is due to the strain developed at the interface due to the electrostrictive nature of the piezoelectric material. The creation of this gap is recognized at Paragraphs 1 and 2 of exemplary document EP0427901. This document states that the problem associated with stacked piezo/electrode devices with outer electrodes is the formation of such a gap due to tensile stresses developed during the application of an electric field. As Tomoya's device is of this same construction, it would inherently encounter the same gaps being developed along the interface.

The compositions of the piezoelectric ceramic created by Tomoya are shown in Tables 1, 2, 4 and 5. Specifically in these tables, those compositions of interest are found in Tables 4 and 5. The average valency of the B-site was computed for all compositions in Table 4. These average Valences are found in the following tables, where the average valency is found at the bottom of each column with the corresponding example number at the top of the column.

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B	Val	49	50	51	52	53	54	55
Zr	4	46	46.4	46.6	46.8	47	46.4	46.8
Ti	4	49	49	49	49	49	49	49
Sb	5						0.83	0.83
Nb	5	3.33	3.33	3.33	3.33	3.33	0.83	0.83
Co	2	1.67	1.25	1.04	0.83	0.63	1.67	1.25
Ta	5						0.83	0.83
W	6						0.42	0.42
Avg Val		3.9999	4.0075	4.0113	4.0151	4.0191	3.9991	4.0067
56	57	58	59	60	61	62	63	64
47	47.2	47.5	47	47	47	46.6	46.6	46.6
49	49	49	49	49	49	49	49	49
0.83	0.83	0.83	1.25		1.25	1.11	1.67	
0.83	0.83	0.83	1.25	1.25		1.11	1.67	1.67
1.04	0.83	0.63	1.04	1.04	1.04	1.04	1.04	1.04
0.83	0.83	0.83		1.25	1.25	1.11		1.67
0.42	0.42	0.42	0.42	0.42	0.42			
4.0105	4.0143	4.0223	4.011	4.011	4.011	4.0113	4.0118	4.0118
65	66	67	68	69	70	71	72	73
47.5	46.6	47.5	46	46.4	46.6	46.8	46.8	47
49	49	49	49	49	49	49	49	49
	1.67	1.67	3.33	3.33	3.33	3.33	3.33	3.33
1.67								
1.04	1.04	1.04	1.67	1.25	1.05	0.92	0.93	0.63
	1.67							
0.83		0.83						
4.0141	4.0118	4.0141	3.9999	4.0075	4.0115	4.0169	4.0171	4.0191

As can be seen from the preceding chart, layered piezoelectric devices of Compositions 50, 55, and 69 have valencies falling squarely in the range of valencies claimed.

Therefore, Tomoya anticipated the instantly claimed apparatus and method of applicant.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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9. Claims 11 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tomoya in JP2003-201174 as applied to claims 9 and 13 above, and further in view of Chen in 5045747.

Please review the rejection above. In brief Tomoya teaches stacked piezoelectric devices and a method of making them. The composition of those piezoelectric devices falls within the range of compositions instantly claimed by applicant.

Tomoya is silent as to the current applied to create the electric field used during processing.

However, Chen teaches an apparatus useful for poling piezoelectric ceramics. This apparatus meets the method applied by Tomoya, wherein the piezoelectric are submerged in an insulating oil and put under a polarizing field. Chen teaches that the electrodes used in creating this field should be connected to a direct current (See Abstract, Column 2, Liners 40-55)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew E. Hoban whose telephone number is (571) 270-3585. The examiner can normally be reached on Monday - Friday from 7:30 AM to 5 PM EST.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jerry Lorengo can be reached on (571) 272-1233. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Matthew E Hoban/
Examiner, Art Unit 1793

/C. Melissa Koslow/
Primary Examiner, Art Unit 1793